

ECE 216 – Electricity and Magnetism

Term – Summer 2019 (201905)

Instructor

Dr. Jens Bornemann

Phone: 721-8666

E-mail: jbornema(at)ece(dot)uvic(dot)ca

Office Hours

Days: Mondays & Thursdays

Time: 14:00 – 15:00

Location: EOW 309

Course Objectives

Study the fundamentals of electromagnetics with emphasis on engineering applications.

Learning Outcomes

Upon completion of this course students should be able to:

1. Evaluate the gradient of a scalar function and the divergence and curl of a vector function in any of the three primary coordinate systems.
2. Apply Coulomb's Law, Biot-Savart Law, Gauss' Law, Faraday's Law, Lenz's Law, Lorentz Force, Ampère's Law, and Maxwell's Equations to solve electromagnetic problems.
3. Evaluate the magnetic force and torque on a current-carrying structure due to a magnetic field.
4. Calculate the resistance, capacitance, and inductance of electromagnetic structures.
5. Use Maxwell's Equations to assess the propagation characteristics of plane waves.
6. Solve transmission-line problems.

Syllabus

Electric charge, Coulomb's Law, electrostatic forces, electric field, Gauss's Law, electric potential, stored energy. Electric current, conduction in a vacuum and in material media, displacement current, magnetic field of a current, force on a current carrying wire, magnetic induction, electromotive force, energy stored in a magnetic field. Capacitance, resistance, inductance, and their characterization. Time-varying fields. Transmission lines.

Lectures:

A-Section(s): A01 / CRN 30247

A-Section(s): A02 / CRN 30248

Days: Mondays & Thursdays

Time: 8:30 – 9:50

Location: ECS 116

Labs: ELL 129 Doug McKenzie (dmckenzi@uvic.ca)

B01 Mon 12:00 – 14:50

B02 Mon 15:00 – 17:50

B03 Wed 12:30 – 15:20

B04 Thu 12:00 – 14:50

B05 Fri 14:30 – 17:20

B06 Thu 16:00 – 18:50

Lab orientations begin week of 06 May 2019
(c.f. schedule below).

Tutorials:

T-Section(s): T01 / CRN 30255

Tue 15:30 – 16:20 ECS 125

Required Text

Title: Fundamentals of Applied Electromagnetics, 6th or 7th ed.
 Author: Ulaby, Michielssen, Ravaioli
 Publisher: Pearson / Prentice Hall
 Year: 2010 or 2015

Optional Text

Title: Engineering Electromagnetics 7th ed.
 Author: W.H. Hayt, J.A. Buck
 Publisher: McGraw-Hill
 Year: 2006

References: Course Website: TBA

Assessment:

Assignments:	10 %	Due Dates: TBA
Labs	20 %	
Mid-term	20 %	Date: 24 June 2019
Final Exam	50 %	

Lab Requirements

- Labs begin on Monday, 06 May 2019.
- See GENERAL LABORATORY REGULATIONS FOR STUDENTS in the lab manual for details about report requirements.
- Purchase the lab manual in the UVic Bookstore.

Note:

1. Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.
2. The aggregate grade of the midterm and the final exam must be a passing grade to pass the course.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

<https://web.uvic.ca/calendar2019-05/undergrad/info/regulations/grading.html>

There will be no supplemental examination for this course.

Note to students: Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Assistant to set up an appointment.

Accommodation of Religious Observance:

<https://web.uvic.ca/calendar2019-05/undergrad/info/regulations/religious-observanc.html>

Policy on Inclusivity and Diversity:

<https://web.uvic.ca/calendar2019-05/general/policies.html>

Standards of Professional Behaviour: You are advised to read the Faculty of Engineering document Standards for Professional Behaviour, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<https://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in the current Undergraduate Calendar for the UVic policy on academic integrity.

<https://web.uvic.ca/calendar2019-05/undergrad/info/regulations/academic-integrity.html>

Equality: This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Course Lecture Notes: Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

Sexualized Violence Prevention and Response at UVic

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

Where: Sexualized violence resource office in EQHR; Sedgewick C119

Phone: 250.721.8021

Email: svpcoordinator@uvic.ca

Web: www.uvic.ca/svp

Laboratory Schedule provided by the Department of Physics and Astronomy will be added here.